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Comments on Struck and Loss Estimates for Harp Seals In the Northwest Atlantic

by

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Abstract

One of the major sources of unreported mortality during the commercial harp seal hunt in the Northwest Atlantic is the number of animals killed or fatally wounded and not recovered by hunters (i.e. seals that are struck and lost). With the significant expansion of the hunt both in Canada and in Greenland during the mid 1990s, there is a concern that unreported moralities of harp seals struck and lost may have reached a level that is not sustainable from a long-term management perspective. To address this problem a study on the number of seals struck and lost in Newfoundland waters was initiated. The preliminary results presented in this paper are based on observations collected by the Marine Mammal Section, DFO and the Sea Watch Observer Program. In general, overall loss rates for beaters taken on the ice varied from 0–2.0% and from 3.2–10.0% when taken in the water. Older seals aged 1+ had loss rates of approximately 1.3–11.1% when taken on ice and rates of 13.8–50.0% when taken in the water. Sample sizes were limited (especially for seals taken in the water) and there was only partial coverage of the hunt. However, these data provide current estimates of struck and loss rates that can be incorporated into harp seal population modeling initiatives.

Résumé

Les animaux abattus ou mortellement blessés qui ne sont pas récupérés par les chasseurs (phoques qui ont été frappés et perdus) constituent l'une des plus importantes sources de mortalité non signalée de la chasse commerciale du phoque du Groenland du nord-ouest de l'Atlantique. L'expansion appréciable de la chasse des phoques tant au Canada qu'au Groenland au cours du milieu des années 1990 fait craindre que la mortalité non signalée de phoques du Groenland qui ont été frappés et perdus pourrait atteindre un niveau non compatible avec une exploitation durable dans le contexte d'une gestion à long terme. Afin de résoudre ce problème, une étude portant sur le nombre de phoques frappés et perdus dans les eaux de Terre-Neuve a été amorcée. Les résultats préliminaires décrits dans le présent document sont fondés sur des observations recueillies par la section des mammifères marins du MPO et par le programme des observateurs Sea Watch. De façon générale, le taux de perte total de jeunes phoques du Groenland attrapés sur la glace variait de 0 à 2,0 % et cette valeur atteignait 3,2 à 10,0 % lorsqu'ils étaient capturés dans l'eau. Le taux de perte des phoques âgés de 1 an et plus atteignait 1,3 à 11,1 % environ sur la glace et 13,8 à 50 % dans l'eau. L'effectif des échantillons était limité (surtout pour les phoques abattus dans l'eau) et la représentativité n'était que partielle. Par ailleurs, ces données constituent des estimations actuelles du taux d'animaux frappés et perdus et peuvent être utilisées pour l'initiative de la modélisation de la population de phoques du Groenland.

Introduction

Estimating the magnitude of unreported harp seal mortality in the Northwest Atlantic during the commercial hunt is a difficult task because there are several major sources contributing to the problem. These include seals that are killed or fatally wounded but are not recovered by hunters (i.e. struck and lost), seals taken in fishing nets as by-catch, and those taken as a result of "highgrading" for various products such as penises (Malouf 1986; Lien et al. 1988). After the closure of the whitecoat hunt in 1983, commercial harp seal catch levels remained relatively low until 1995; during this time period sources of unreported mortality were not considered to be serious conservation issues. However, with the significant expansion of the hunt in both Canada and Greenland during the mid 1990s there is growing concern that unreported moralities of harp seals may have reached a level that is not sustainable from a long-term management perspective. Until recently, there was little, or no, quantitative information available on these three major sources of unreported mortality.

A recent study by Lavigne (1999) reviewed the literature on harp seal stuck loss rates and presented estimates of the total number of harp seals lost during the commercial hunt in the northwest Atlantic. Much of the information available from the literature is limited in geographic scope, outdated, and highly variable. Good quality data are difficult to collect because loss rates are influenced by several factors: the skill of the hunter; whether the seal is taken on ice or in the water; sea and weather conditions at the time; the age and body condition of the seal; and, the time of year (Sergeant 1991; Lavigne 1999). This complex suite of interacting factors is responsible for the highly variable nature of struck and lost data. Lavigne (1999) cites loss rates for 1+ age harp seals that varied from 0–85% depending upon some, or all, of the above mentioned factors. For younger seals there are virtually no data available; Rowsell's (1977) report of a 1.3% struck and loss rate for beaters taken on ice is the only study. In addition, all of these data are pre–1980 and it is important to note that the characteristics of the commercial hunt in Canadian waters and the hunt in Greenland waters have changed over the intervening years.

More data on the number of seals struck and lost are required if this source of unreported mortality is to be appropriately accounted for in harp seal stock assessments and management initiatives. Marine Mammal personnel working for the Department of Fisheries and Oceans (DFO) have attempted to collect struck and loss information as part of their ongoing research activities since the early 1980s. In 1998, a more directed study monitoring longliner catches was initiated, and in addition, the Sea Watch Observer Program assigned personnel to several longliners to monitor the hunt and to collect statistics (including loss rates). This manuscript provides preliminary estimates of struck and loss rates based on observations collected by Marine Mammal, DFO and Sea Watch personnel. In many cases sample sizes are often small (especially for seals taken in the water) and represent only limited coverage of the hunt. However, these data are useful from a comparative perspective and will also provide the basis for discussions on what struck and lost estimates should be incorporated into harp seal population modeling initiatives.

Methods

In recent years the commercial harp seal hunt has been prosecuted by inshore sealers using boats < 35 ft and by sealing crews aboard 35 - 65 ft longliners; the majority of the TAC (total allowable catch) is taken by the longliner crews from late March to mid May. The information on harp seals killed or fatally wounded and not recovered (struck and lost) during the commercial hunt comes from three main sources: 1) longliners chartered by DFO personnel to sample beaters for morphometrics and body condition, 2) large vessels (>65 ft.) chartered by DFO personnel to conduct biological sampling of seals during the late winter prior to whelping and on the moulting patch, and 3) Sea Watch Observers assigned to longliners to monitor the spring hunt. The Sea Watch Observer Program is administered by the Conservation and Protection Branch of Fisheries Management, DFO and is delivered jointly with Science Branch, DFO in Atlantic Canada and Quebec. The goals of the Program are to ensure compliance with the Marine Mammal regulations and to provide scientific and strategic information to improve the management of the harp seal hunt.

Longliners were chartered in either April or May of 1982, 1983, and 1984. Although the primary objective of these trips was to sample beaters, all age-classes of seals were taken, a professional sealing crew was used in all years, and hunting activities were conducted using the same methods as those used during the commercial hunt. In 1998, the longliners were not chartered, but instead, DFO technicians accompanied the commercial sealing crews during routine spring hunting trips (n=3 trips). The duration of each trip was 10–14 days. Large vessel charters were conducted during late winter (January or February) or in the spring (April or May) of 1983, 1992-95, and in 1998. Trip duration's varied between 10-14 days. A professional 'gunner' shot seals from the bow of the ship as it moved slowly through the ice. Crew members recovered the carcasses either by jumping over the side of the vessel on to the ice or by using a speedboat. On all trips DFO personnel documented struck and loss information (age class of the seal lost and whether it was taken on ice or in the water) and collected biological samples.

The Sea Watch Observer Program for the commercial harp seal hunt was initiated in the spring of 1998. A total of 6 observers were assigned to longliners and they each monitored a trip lasting 10-14 days during mid March to mid April. Their duties included: completing a daily log of all general hunting activities (i.e. location, ice conditions, and weather conditions); documenting the number, species, and age-class of seals taken (beater, bedlamer, and adult); recording the number and age of seals struck and lost; and collecting biological samples.

Results

A summary of young harp seals (primarily beaters and some ragged jackets) shot and lost as observed by DFO personnel during the commercial longliner hunt is presented in Table 1. From a total of 712 seals taken over a period of 4 years the overall loss rate was 1.4%. Those seals shot in the water had a higher loss rate than those shot on the ice (3.2% vs 1.2% respectively). Table 1 also summarizes comparable information on 1+ aged seals taken from longliners. The overall loss rates for these older seals was 43.4%, however, there is a notable difference in the rate depending on whether the seal was taken on ice or in the water. Those taken on ice had a loss rate of 11.1% while 50.0% of those shot in the water were not recovered.

Struck and loss information obtained by DFO personnel working from larger vessels are summarized in Table 2. The overall loss rate for beaters was 2.9% and for 1+ seals 3.2%; however, sample sizes for young seals taken both on the ice and in the water were small. As in the longliner case, there was a difference in the shot and loss rate for 1+ animals depending on whether the seal was taken on ice (2.9% loss) or in the water (13.8% loss).

The 1998 hunt marked the first year of the Sea Watch Observer Program; six observers were put on longliners during the peak sealing season. Although there were some inconsistencies in the nature and amount of detail documented in the logbooks, there were good quality data from each trip (Table 3). Based on comments in the logbooks, most or all seals taken were shot or killed with a hakapik on the ice. Estimated loss rates for beaters varied from 0–2.0%. Given that 5/6 trips targeted beaters, there was limited information available on older seals, however, data from one trip (Trip 3) indicated that the loss rate was 1.3%. In some cases additional information for older seals was obtained because observers noted in their logbooks on which days these animals were taken. Loss rates for 1+ aged seals taken during a two day period on Trip 2 was 3.6% (8/224). For 1+ aged seals taken during a six day period on Trip 3, the loss rate was 2.2% (18/836).

Discussion

Struck and Loss Rates for Young Seals

These data on overall loss rates of young seals (primarily beaters) taken on the ice are consistent with Rowsell's (1977) estimate of 1.3%. The somewhat higher loss associated with the large vessel hunt and the lower rates estimated by Sea Watch Observers may in part be a reflection of sample sizes; small in case of the DFO data set and very large for Sea Watch data. Although there is only one year of observations from the Sea Watch Program, it appears that seal hunters who prosecute the fishery on a large scale can achieve low struck and loss rates when beaters on the ice are targeted.

The loss rates for beaters taken in the water were somewhat higher than for seals taken on the ice, however, the difference is not as great as in older seals (see below). It is important to note that the sample sizes for beaters taken in the water were low; more observations are needed to firmly establish the difference between 'on ice' and 'in water' loss rates. This is an issue of concern because during the early 1990s the proportion of beaters in the commercial catch has varied from a low of 41.0% to a high of approximately 83.0% (Stenson et al. 1999). The hunt catch statistics underscore the need to identify and understand the ecological factors that strongly influence beater haul out behavior (e.g. time of season, freezing rain, floe size and ice tightness).

When Lavigne (1999) estimated the number of beaters struck and lost during the commercial hunt he used two figures - 10.0% and 25.0%. He selected a lower and a higher estimate to reflect the uncertainty associated with proportion of beaters in the water at the time of the hunt. Since the author could not find struck and loss data for beaters he assumed his estimates were reasonable given what was known about the loss rates of older seals. Keeping in mind Rowsell's estimate and the information presented here, it appears that a 10% "low end" estimate for beaters taken on the ice is too high. Until there are additional data on loss rates of beaters taken in the water it will be difficult to further evaluate Lavigne's 25.0% estimate. However, based on the information presented here, it is likely too high.

Struck and Loss Rates for 1+ Aged Seals

A wide range of loss rates for 1+ aged seals shot in the water are summarized in Barchard (1978) and Malouf (1986). The overall loss rate of 43.4% for 1+ aged seals taken by DFO longliners in this study falls at the lower end of the 50–85% range documented by Barchard (1978) and near the middle of the 0–65% range reported by Malouf (1986). A similar interpretation is obtained when the rates for older seals shot in the water are compared to the published estimates. However, it is important to note that given the paucity of data it is not possible to adequately account for potentially significant geographic and seasonal differences when making these general comparisons. The overall loss rate of 3.2% for older seals taken on DFO large vessels is considerably lower than the longliner data and almost all published estimates. This is most likely a result of low sample sizes in the longliner data set and the extremely variable sample sizes for the large vessel data set.

The estimates of loss rates for 1+ aged seals taken on the ice by DFO and Sea Watch personnel ranged from 1.3–11.1% and were, as expected, considerably lower than in water loss rates. There appears to be no published reports of loss rates for older seals taken on ice; however, it should be noted that these data are higher, but do not vary greatly from the on ice beater loss rates. Several factors may contribute to this difference, older seals tend to be more wary and dive for the water faster than beaters making it more difficult to get a good shot. If a killing shot is not delivered, older and larger seals make an instinctive lunge into the water even when fatally wounded – beaters will often remain on the ice and a second shot can be taken. Killing methods may also explain some of the difference; a high proportion of the beaters were

killed with a hakapik while older seals were usually shot (Sea Watch Observer Logbooks).

When Lavigne (1999) estimated the number of 1+ aged harp seals shot and lost in the Northwest Atlantic he used two figures –20% and 50%. He considered a 50% loss rate to be a conservative estimate for older seals taken in the water by Canadian and Greenlandic hunters. The 20% loss rate acknowledged that a significant proportion of the 1+ aged seal hunt was prosecuted during the moulting period when seals were on the ice. Information presented here on loss rates for older seals taken on the ice suggests that Lavigne's 20% figure is likely high. Given the variability of loss rates for older seals taken in the water presented here, and in the literature, it is not possible to further evaluate Lavigne's 50% estimate but it appears to be reasonable.

Data Quality and Comparability

The information collected on seals stuck and lost by DFO personnel accompanying sealing crews during the spring longliner hunt in 1998 is well documented and seals were taken by professional hunters during the peak of the spring commercial hunt. DFO personnel did not knowingly alter the hunting activity and routine duties of the crews. The observations and information collected on loss rates from longliners during the spring hunt are as representative as possible given the circumstance.

Information on loss rates collected from DFO chartered longliners in the early 1980s is of similar quality and relevance as the 1998 data. Hunters were requested by DFO to take beaters when possible during these trips; all other aspects of the crew's hunting activity were routine. This request for beaters was not restrictive or unusual given that in recent years beaters are often targeted by the sealers during the spring longliner hunt anyway.

Struck and loss data collected from DFO large vessel charters are well documented but are not as directly comparable to routine hunting activity of commercial longliners from a technical perspective (e.g. different shooting techniques, longer time taken to recover seals, and variable behavioral responses of seals to the vessel). However, it is important to note that during the spring the vessel was used as a hunting platform in the moulting patch where most of the longliner sealing activity was also concentrated. Therefore, the hunting conditions in terms of local weather, ice characteristics, and availability of hauled out seals were typical and comparable to those experienced by longliners in the area. It is quite likely that the technical aspects of hunting from a large vessel compared to a longliner are most similar when hauled out seals are targeted (as was the case in 1998). At present, there is not enough data to quantitatively evaluate how important some of the technical differences might be, but they are probably not serious enough to compromise the integrity of the data set for some preliminary comparisons.

Overall the Sea Watch observers did a good job monitoring the 1998 hunt, however, some modifications are required to improve the quality of the stuck and lost data. There were inconsistencies among observers as to the detail and type of data recorded. Most notably, some observers did not clearly and consistently indicated the age class of the seal lost. In most cases this was not a problem because virtually the entire catch was beaters and therefore it was possible to confidently assume that most of the seals lost were beaters. In other cases observers provided sporadic daily shot and lost figures that clearly indicated what age classes were being hunted that day. This type of information was useful when trying to evaluate the shot and lost rate for the entire trip.

In some logbooks it was often unclear whether seals were taken on the ice or in the water; however, when the observers were questioned, they confirmed that in 1998 most, or all seals, were taken on the ice. And finally, in some logbooks it was difficult to determine if the entire days catch was monitored (i.e. as evidenced by one or two crews hunting from speedboats while the observer was aboard the longliner). This was a more difficult problem to address because to fully account for the activities of the speedboat crews the observers would have had to note in their logbooks what proportion of their take was actually monitored. Given that this was not always done in sufficient detail, information collected in 1998 has been conservatively summarized taking this limitation into account.

Future Research and Recommendations

Marine Mammal personnel plan to continue collecting biological samples and struck and lost information from longliners during the peak-sealing season for another year. Given there is little quantitative information on the inshore small boat (<65 ft) hunt, the Section is currently preparing a monitoring program for the 1999 spring hunt. Marine Mammal personnel will also provide detailed suggestions on how to improve struck and lost data collection by observers in the Sea Watch Program and participate in the observer's training seminars to ensure that all concerned understand the importance and use of the requested information. Given the increased scale of the harp seal hunt in Greenland waters, the higher proportion of older seals in the catch, and the higher incidence of seals taken in the water the Section will support all efforts by Greenland to study struck and loss rates. Catch statistics and information on loss rates for harp seals taken in the Canadian Arctic have not been updated for a number of years; this problem should be addressed as soon as possible.

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Table 1. Estimates of harp seal struck and loss rates based on observations made by DFO personnel on longliners during the commercial hunt in April and May (no. lost/total no. struck).

Year	Beaters		1+ Aged Seals	
	Ice	In water	Ice	In water
1982	NA	1/8	NA	1/1
1983	0/1	0/40	NA	13/29
1984	NA	I/2	NA	8/10
1998	8/648	0/13	1/9	0/4
Total	8/649 – 1.2%	2/63 – 3.2%	1/9 – 11.1%	22/44 – 50.0%
G. Total	Beater 10/712 – 1.4%		1+ Aged Seals 23/53 – 43.4%	

Table 2. Estimates of harp seal struck and loss rates based on observations made by DFO personnel on large vessels during the late winter and spring (no. lost/ total no. struck).

Year	Beaters		1+ Aged Seals	
	Ice	In water	Ice	In water
1983	0/14	NA	1/7	NA
1992	0/8	NA	10/506	NA
1993	0/1	NA	8/97	2/20
1994	NA	0/2	0/85	2/9
1995	0/1	NA	1/5	NA
1998	NA	1/8	17/567	NA
Total	0/24 – no loss	1/10 – 10.0%	37/1267 – 2.9%	4/29 - 13.8%
G. Total	Beaters 1/34 – 2.9%		1+ Aged Seals 41/1296 – 3.2%	

Table 3 Estimates of harp seal struck and loss rates based on observations made by Sea Watch observers on longliners during the commercial hunt in April and May (B=beater; A=1+aged seal; no. lost/no. struck).

Trip No.	Age Class of Seals	No. Struck and Lost	Loss Rate for Trip
Trip 1	B=1824; A=229	40/2053	2.0%
Trip 2	B=3228; A=218	19/3446	0.6%
Trip 3	B=7; A=1380	18/1387	1.3%
Trip4	B=1002; A=3;	0/1005	No Loss
Trip 5	B=3006; A=3;	5/3009	0.2%
Trip 6	B=888; A=10;	0/898	No Loss